

Applied A.I. Solutions

Data Visualization Techniques

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DATA VISUALIZATION TECHNIQUES

Dashboards and Scorecard

Balanced Scorecard

Dashboards and Scorecards

- They are easy to read user interface showing a visual representation of the current status (snapshot) and historical trends of an organization's key performance indicators to enable root-cause analysis, problem-solving, and quick informed decisions making
- Dashboards and scorecards are measurement systems built on integrated data (DW) to help view business performance

Dashboard – Daily Operations	Scorecard – Tactic and Strategy
Business Activity Process Monitoring (BAM) or Business Process Measurement (BPM)	Business Performance Measurement (BPM)
Monitor day-to-day operations through visualization	Monitor business performance through indicators (KPIs).
Monitored actions taken at the operational level	Performance measurement, problem solving through root-cause analysis
KPIs to highlight milestones in operations	KPIs to measure success in each areas as defined in the strategy map.
Graphs, grids and variety of visualization techniques to highlight operational data	Scorecards commonly use symbols and icons.

Sales Manager Dashboard: Last Month

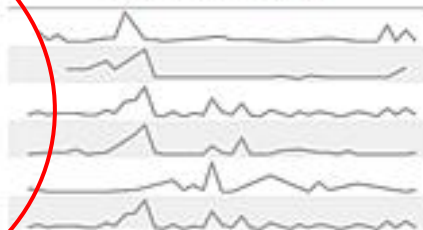
Date Range

Month

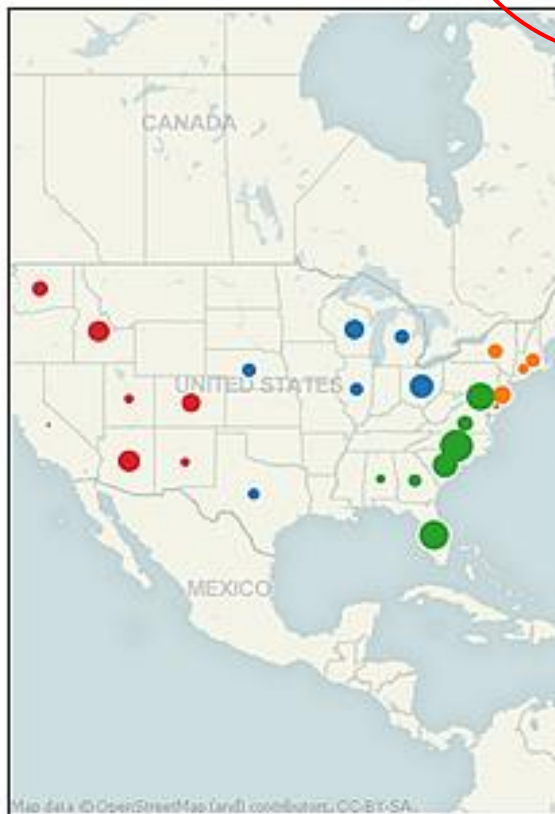
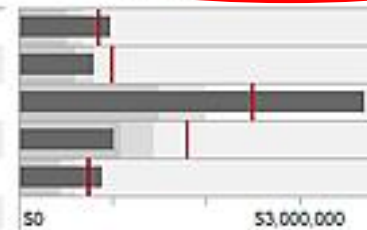
Manager	Sales	
	Current	Prior
Chris	\$116,613	\$34,793
Erin	\$50,363	\$77,486
Pat	\$464,308	\$270,805
Sam	\$194,601	\$92,129
William	\$102,731	\$66,397
Grand ..	\$928,615	\$541,610

	Profit	
	Current	Prior
Chris	\$7,414	\$886
Erin	(\$3,180)	\$13,014
Pat	\$21,298	\$32,437
Sam	\$7,471	\$12,430
William	\$9,593	\$6,106
Grand ..	\$42,596	\$64,873

Sales Over Range



Annual Quota



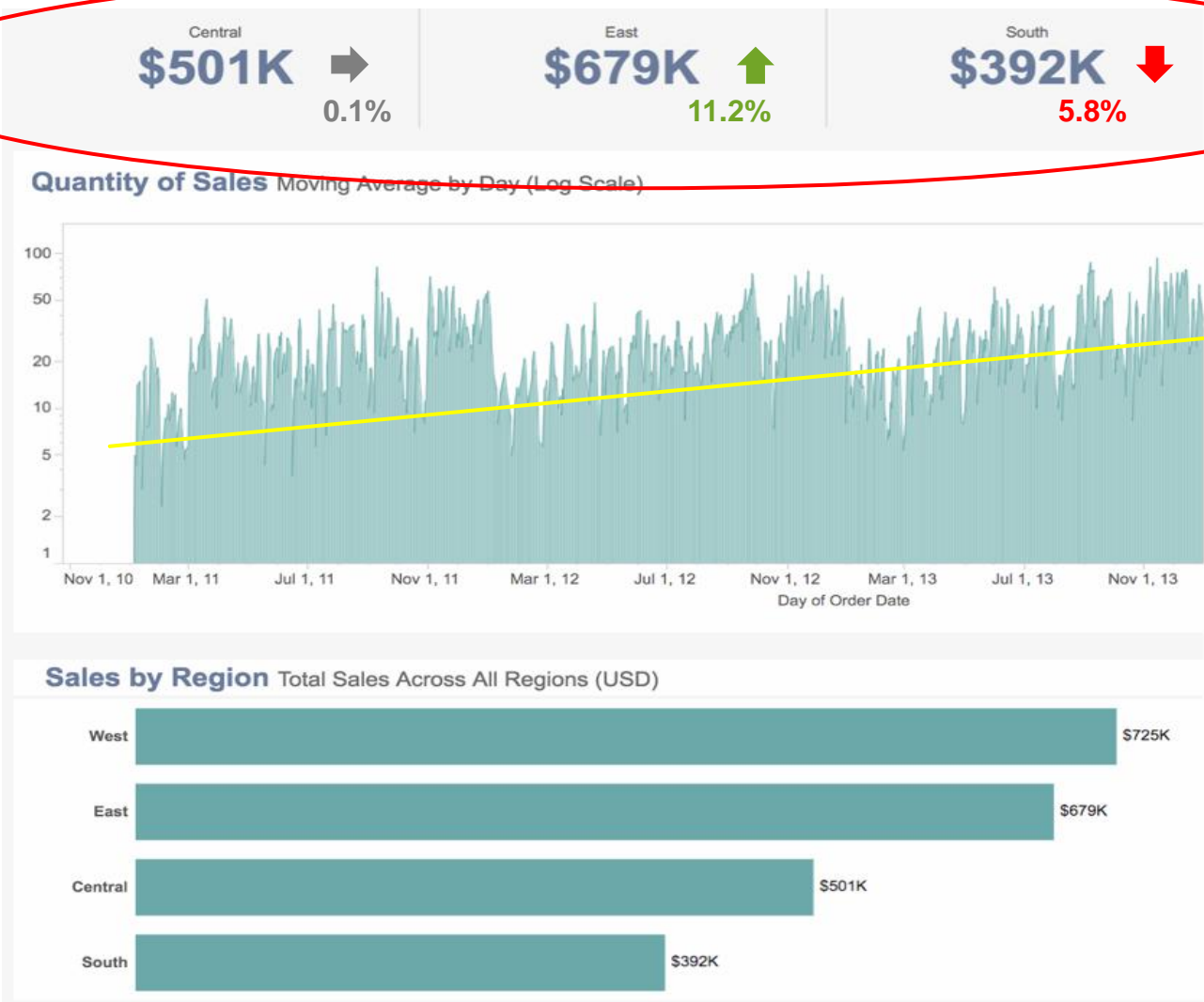
Select Region to See Sales



Recent Orders

Month, Day, ...	Manager	Customer Name	Sales	Profit	Profit Ratio
July 31, 2010	Pat	Lisa DeCherney	\$9,526	(\$242)	-2.54%
		William Brown	\$1,698	\$42	2.49%
	Sam	William Brown	\$1,698	\$42	2.49%
July 30, 2010	Erin	Lisa DeCherney	\$9,526	(\$242)	-2.54%
		Ruben Ausman	\$1,772	\$391	22.06%
	Pat	Kean Thornton	\$163	(\$91)	-55.86%
July 29, 2010	Erin	Ruben Ausman	\$1,772	\$391	22.06%
		William	\$163	(\$91)	-55.86%
	Pat	Joni Blumstein	\$118	\$45	37.80%
July 28, 2010	Erin	Harold Pawlan	\$10,604	\$3,312	31.24%
		Sam	\$118	\$45	37.80%
	Pat	Harold Pawlan	\$10,604	\$3,312	31.24%
July 27, 2010	Chris	Sanjit Engle	\$304	\$23	7.66%
		Pat	\$304	\$23	7.66%
	Erin	Thea Huddings	\$204	(\$205)	-100.29%
July 26, 2010	Erin	Nora Price	\$260	\$45	17.42%
		Pat	\$260	\$45	17.42%
	Pat	Tony Sayre	\$1,559	\$548	35.18%
July 25, 2010	Pat	Ken Heidel	\$4,851	(\$3,692)	-75.95%
		Nora Price	\$260	\$45	17.42%
	Erin	Thea Huddings	\$204	(\$205)	-100.29%
July 24, 2010	Pat	Tony Sayre	\$1,559	\$548	35.18%
		Sam	\$4,851	(\$3,692)	-75.95%
	Erin	Ken Heidel	\$4,851	(\$3,692)	-75.95%

Sales Performance Scorecard



KPI ratios

Converted Leads: 0.92 ↑ 0.8%

Converted Sales: 0.65 ↓ 1.2%

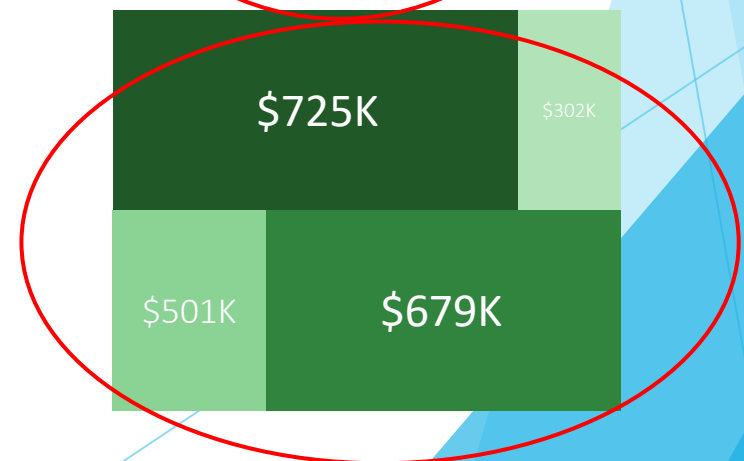
Win/Lose: 0.85 ↑ 0.4%

Best Month Performers

Alan Smith(N):\$90K ↑ 1.1%

Jessica Parker(S):\$87K ↑ 2.3%

John Khan(C):\$70.4K ↓ 0.7%



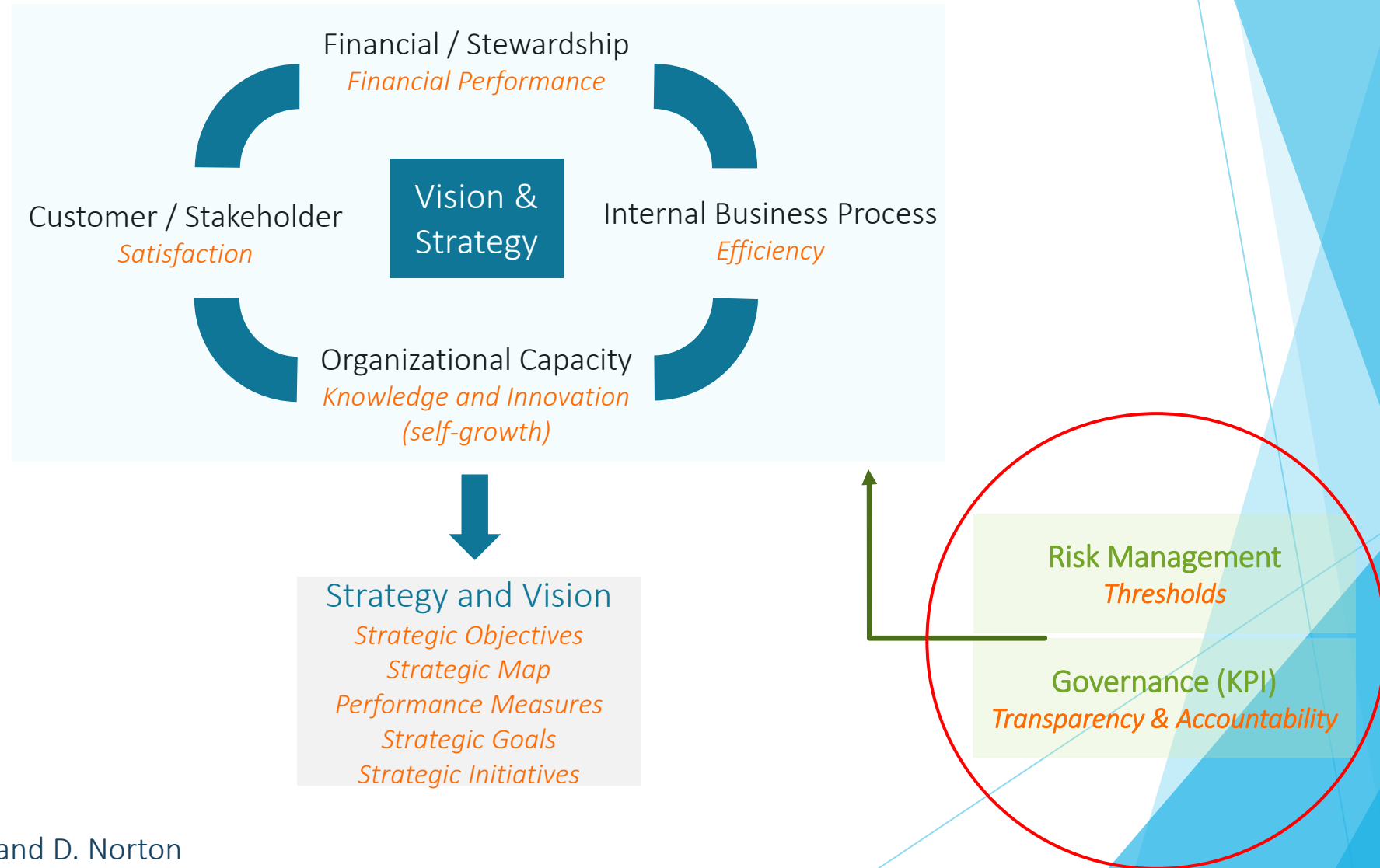
DATA VISUALIZATION TECHNIQUES

Balanced Scorecard

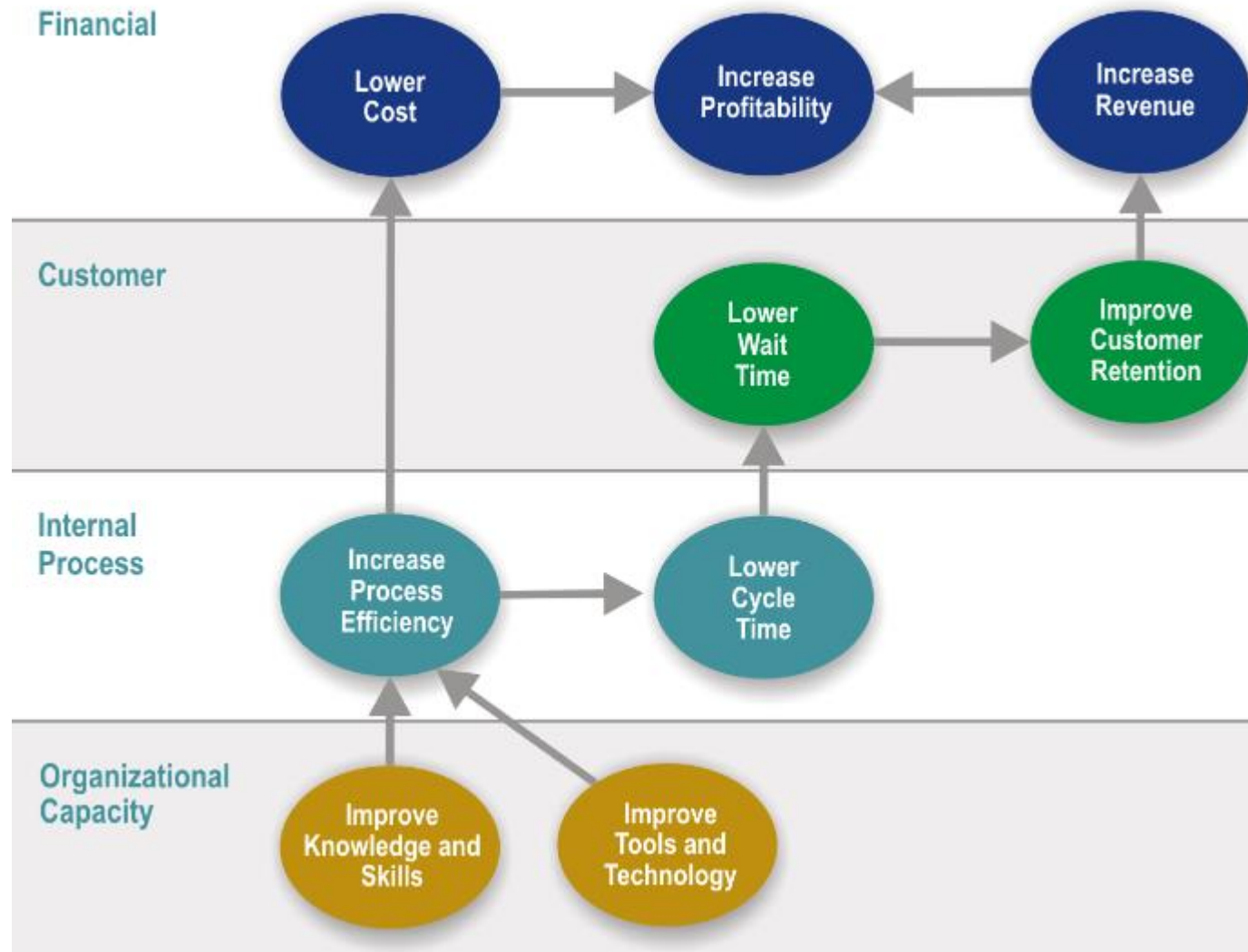
Balanced Scorecard

- It is a **strategic planning and management system** that is used to **align business activities to the vision and strategy of the organization**, improve internal and external communications, and monitor organization performance against strategic goals
- It is a performance measurement framework (KPIs) that **adds** strategic **non-financial performance measures** to traditional financial metrics to give a more 'balanced' view of overall organizational performance
- It is supported by design methods and automation tools, to keep track of the execution of activities and to monitor the consequences arising from these actions

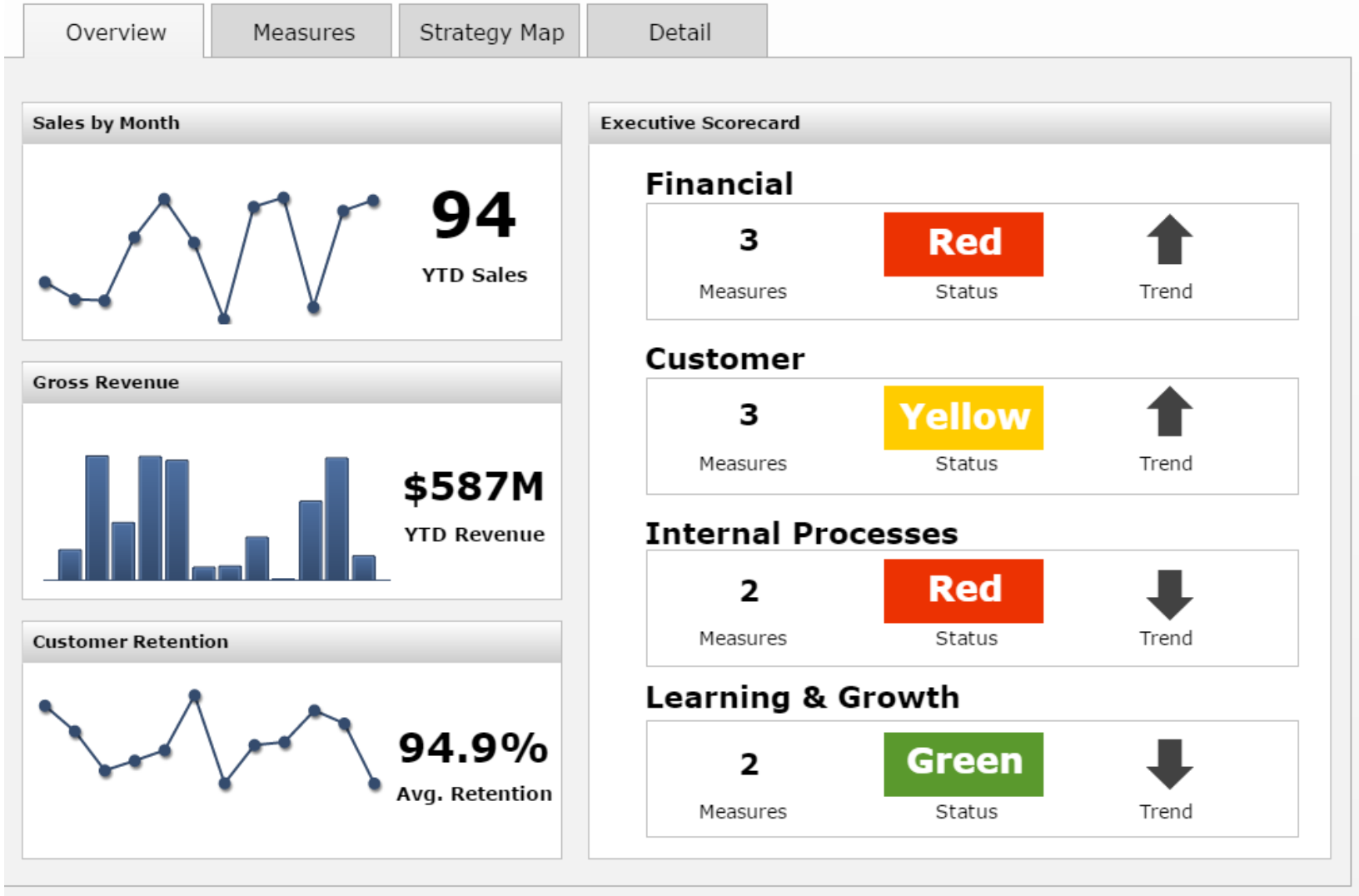
Balanced Scorecard 4+ Pillars



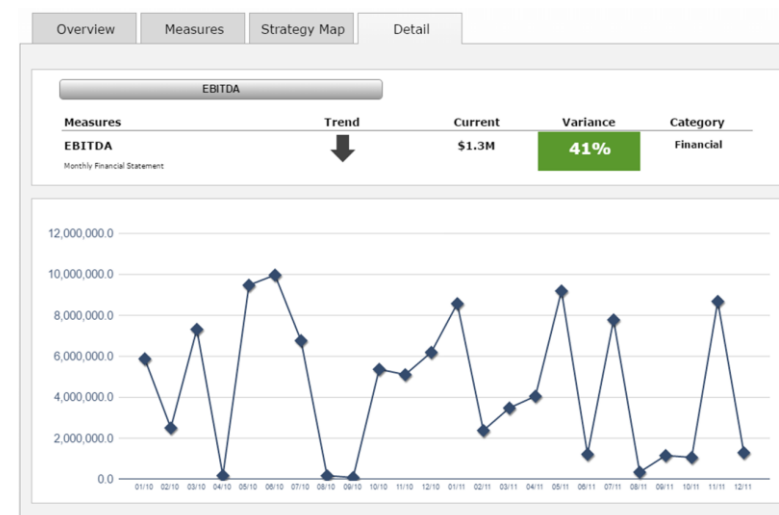
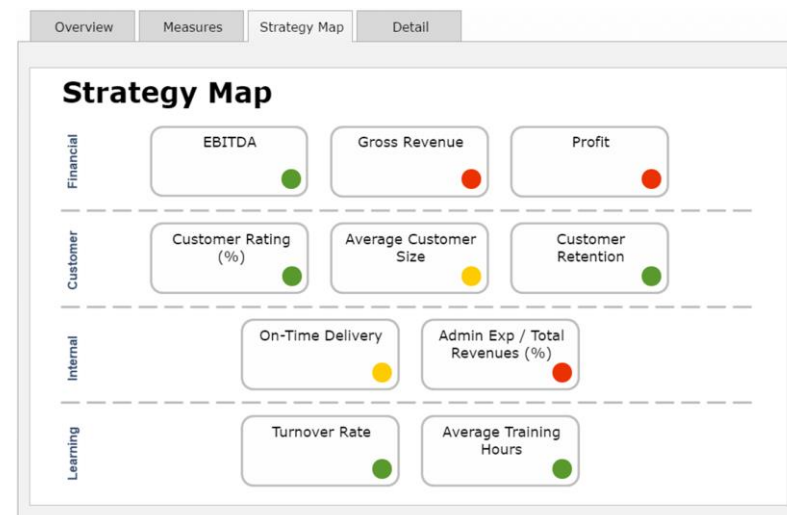
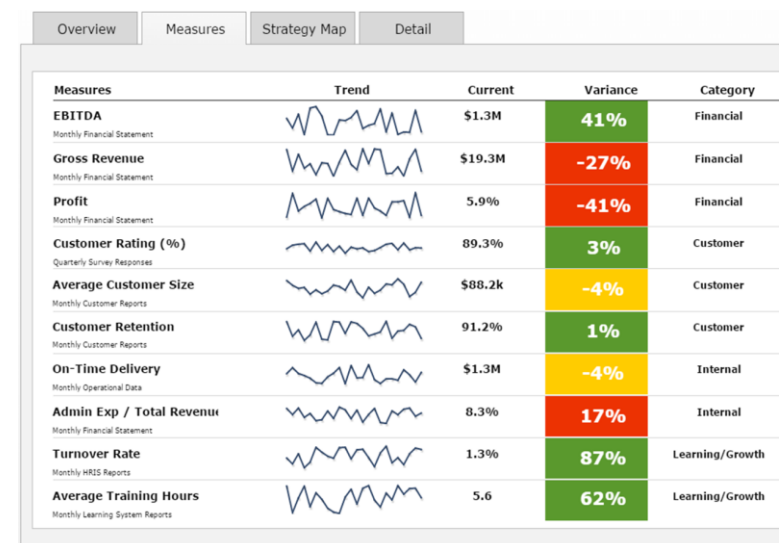
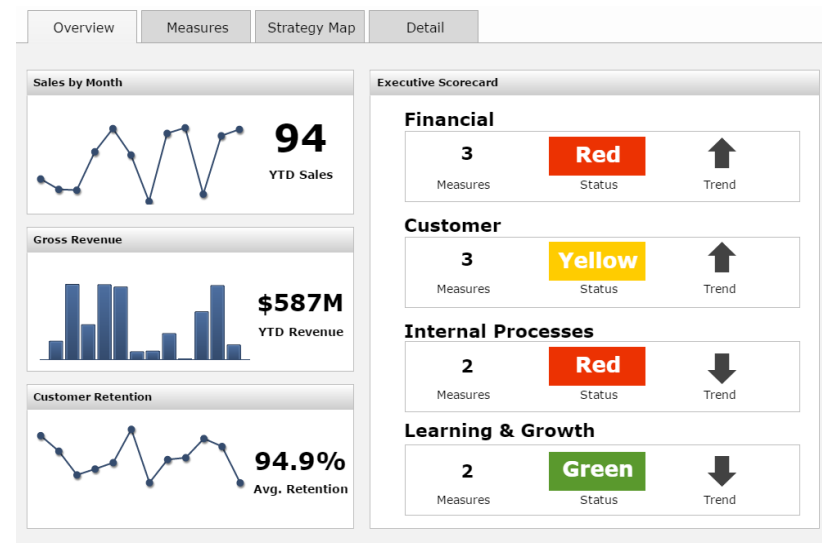
Balanced Scorecard – why the 4+ Pillars



CEO's Balanced Scorecard



CEO's Balanced Scorecard



DATA VISUALIZATION TECHNIQUES

Best Practices for Effective
Dashboards and Scorecard

1. What's your goal? What's your purpose and audience?

- The best visualizations have a clear purpose and work for their intended audience.
- What will you be trying to say with this dashboard?
- Are you presenting a conclusion or a key question?
- Do you know your audience?
- Does your audience know this subject matter extremely well or will it be new to them?
- What kind of cues will they need?

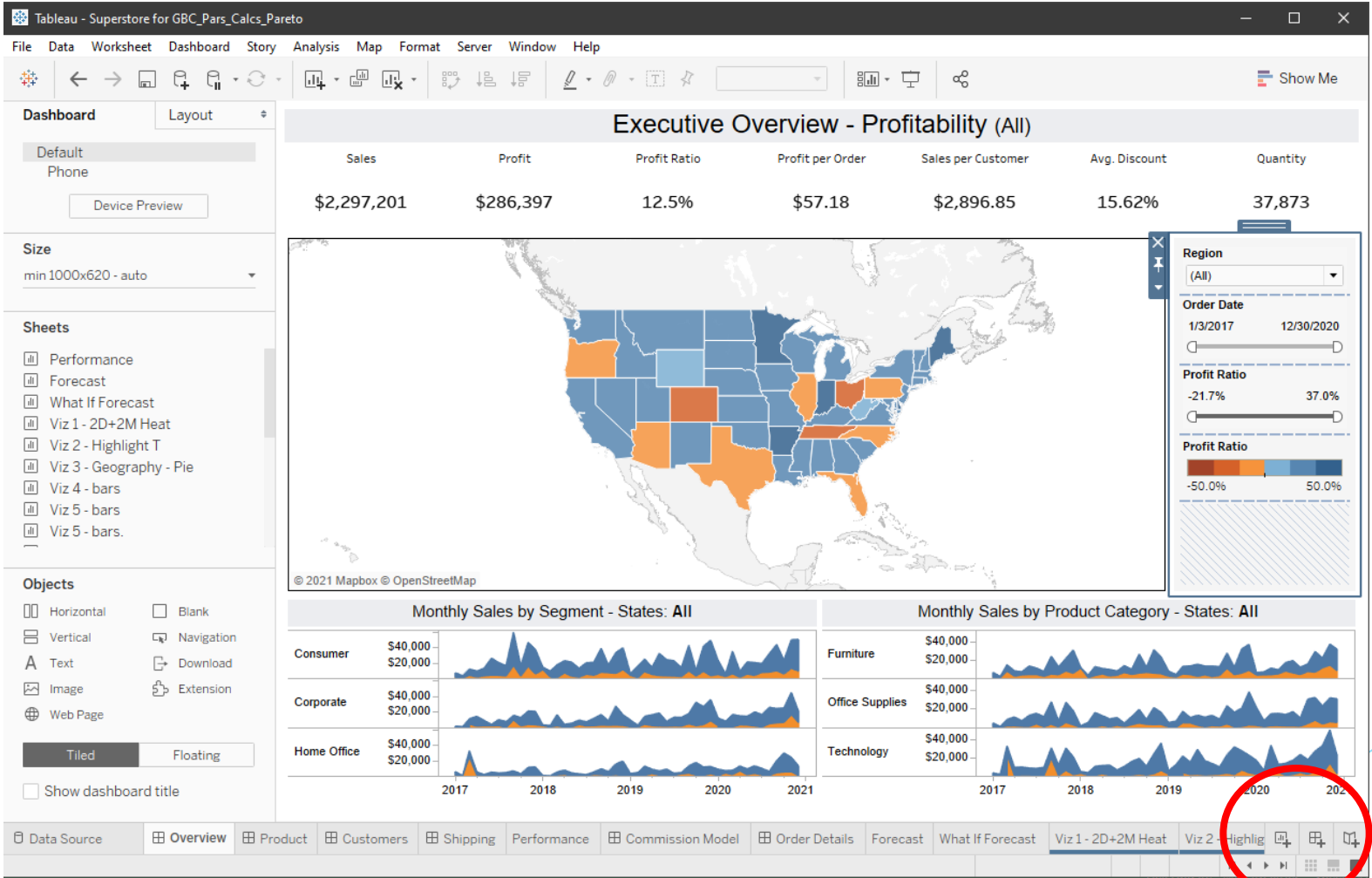
2. Leverage the most-viewed spot

- Most viewers scan web content starting at the top left of a web page. Once you know your dashboard's main purpose, be sure to place your most important view so that it occupies or spans the upper-left corner of your dashboard.

3. Design for the real world
4. Author at your final display size
5. Limit the number of views
6. Add interactivity to encourage exploration
7. Show filters
8. Enable highlighting

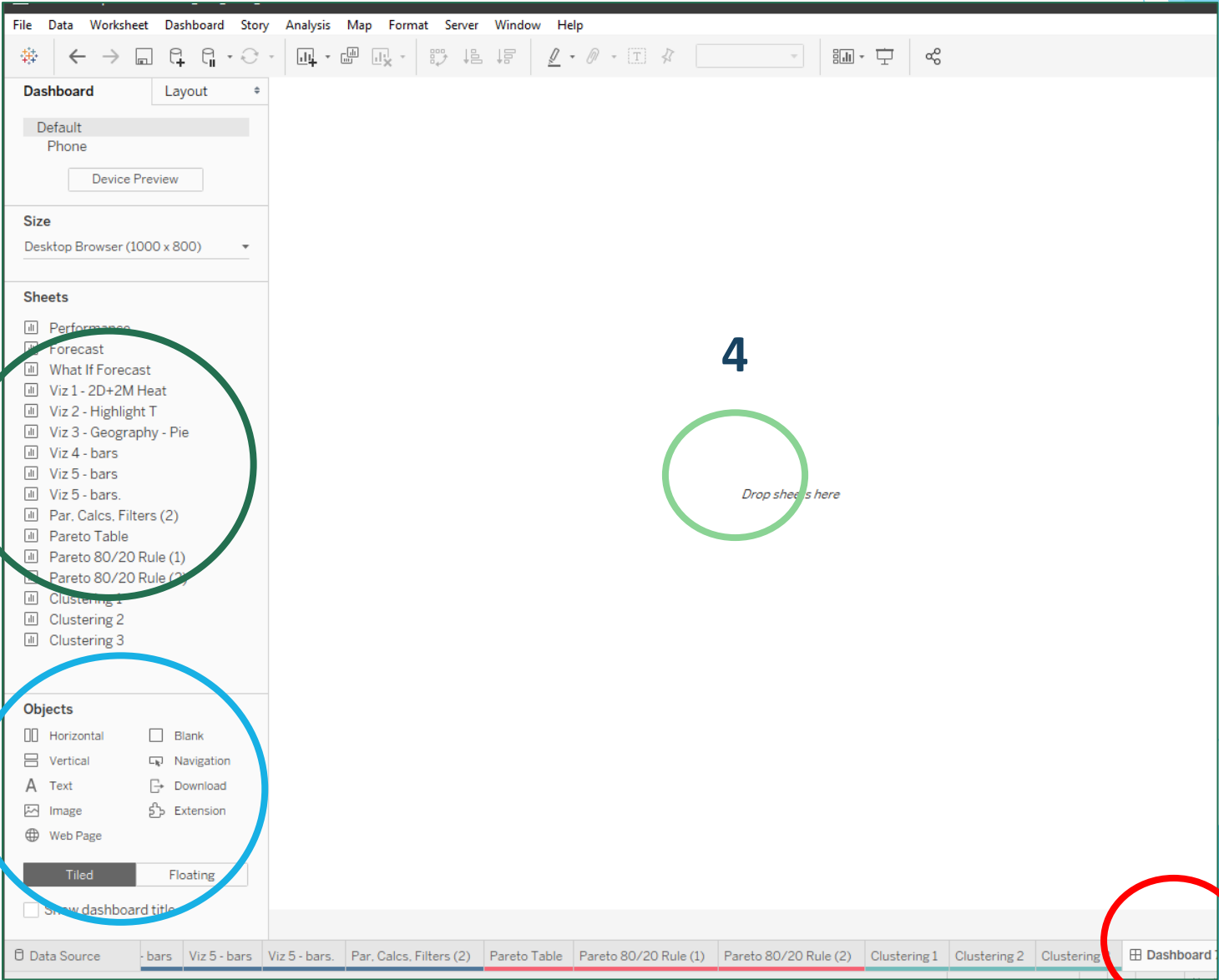
Dashboard and Scorecard Design and Development

Dashboard creation



1

Dashboard creation



The screenshot shows the Tableau Desktop interface with the following elements highlighted:

- 1**: The **Dashboard** tab in the top navigation bar.
- 2**: The **Sheets** list on the left sidebar, which contains various data sources and visualizations.
- 3**: The **Objects** list on the left sidebar, which includes options like Horizontal, Vertical, Text, Image, Web Page, Blank, Navigation, Download, and Extension.
- 4**: The central workspace area with the text "Drop sheets here" and a green circle indicating where to place sheets.

3

Dashboard

Layout

Default

Phone

Device Preview

Size

Desktop Browser (1000 x 800)

Sheets

Performance

Forecast

What If Forecast

Viz 1 - 2D+2M Heat

Viz 2 - Highlight T

Viz 3 - Geography - Pie

Viz 4 - bars

Viz 5 - bars

Viz 5 - bars.

Par, Calcs, Filters (2)

Pareto Table

Pareto 80/20 Rule (1)

Pareto 80/20 Rule (2)

Clustering 1

Clustering 2

Clustering 3

Objects

Horizontal

Blank

Vertical

Navigation

Text

Download

Image

Extension

Web Page

Tiled

Floating

Show dashboard title

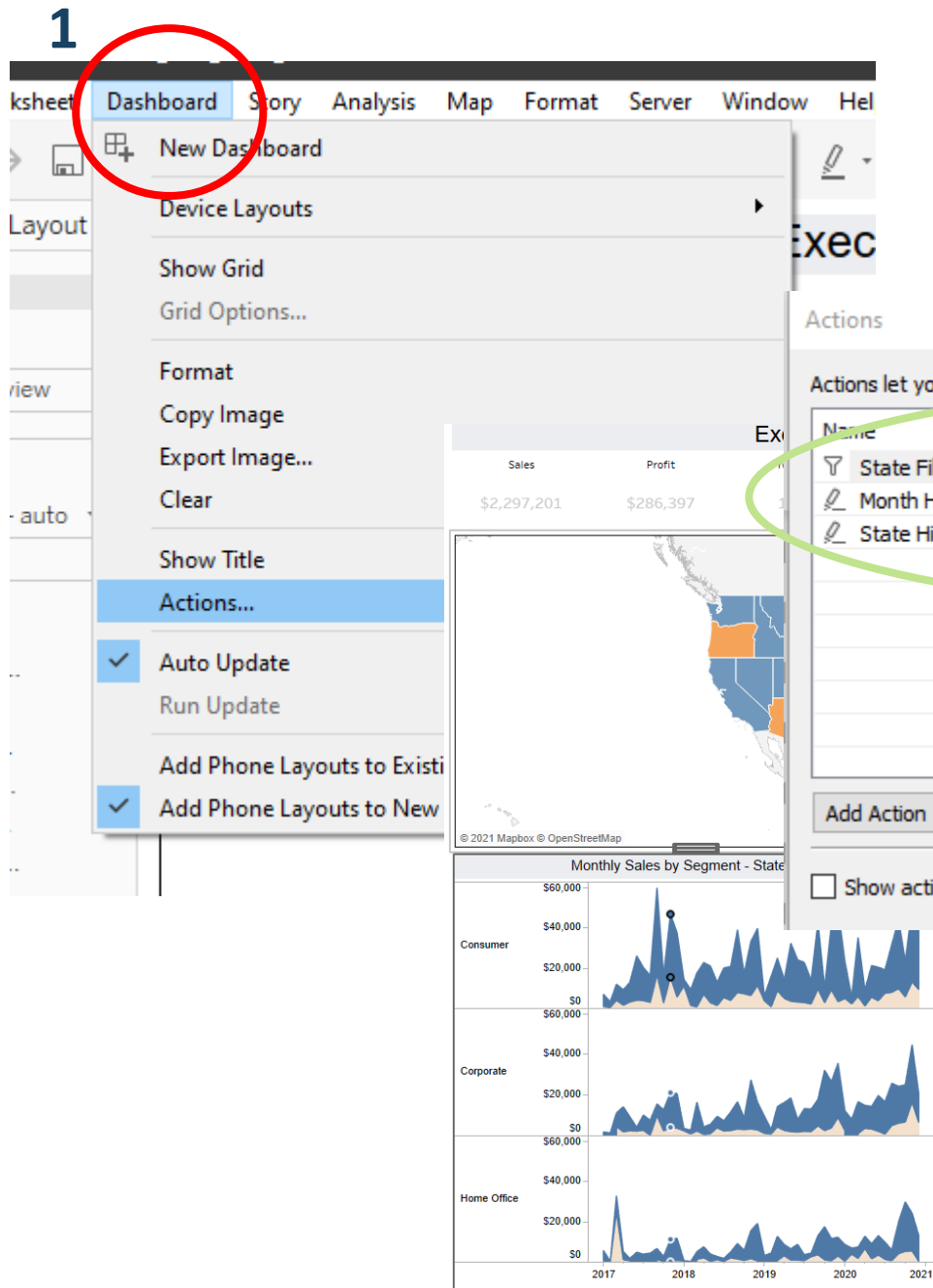
1



2

Actions

1



ksheet Dashboard Story Analysis Map Format Server Window Hel

New Dashboard

Device Layouts

Show Grid

Grid Options...

Format

Copy Image

Export Image...

Clear

Show Title

Actions...

✓ Auto Update

Run Update

Add Phone Layouts to Existi

✓ Add Phone Layouts to New

Sales Profit

\$2,297,201 \$286,397

Monthly Sales by Segment - State

Consumer

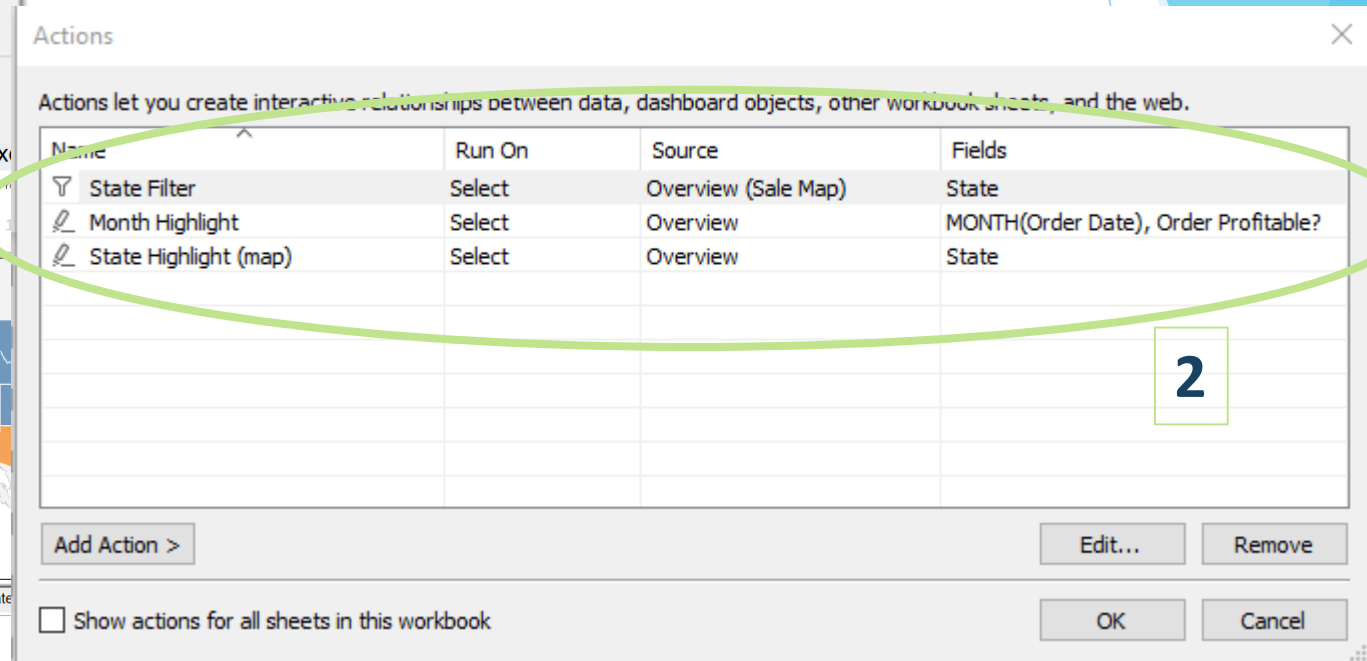
Corporate

Home Office

2017 2018 2019 2020 2021

2021 Mapbox © OpenStreetMap

2



Actions

Actions let you create interactive relationships between data, dashboard objects, other workbook sheets, and the web.

Name	Run On	Source	Fields
State Filter	Select	Overview (Sale Map)	State
Month Highlight	Select	Overview	MONTH(Order Date), Order Profitable?
State Highlight (map)	Select	Overview	State

Add Action >

Edit... Remove

OK Cancel

☐ Show actions for all sheets in this workbook

Actions

1 Edit Filter Action

Name: **State Filter**

3 Source Sheets

Run action on:

- ☐ Overview
- ☒ Sale Map
- ☐ Sales by Product
- ☐ Sales by Segment
- ☐ Total Sales

2

☐ Single-select only

Target Sheets

☒ Overview

☐ Sale Map

☒ Sales by Product

☒ Sales by Segment

☒ Total Sales

Clearing the selection will:

- ☐ Keep filtered values
- ☒ Show all values
- ☐ Exclude all values

4

Target Filters

☒ Selected Fields ☐ All fields

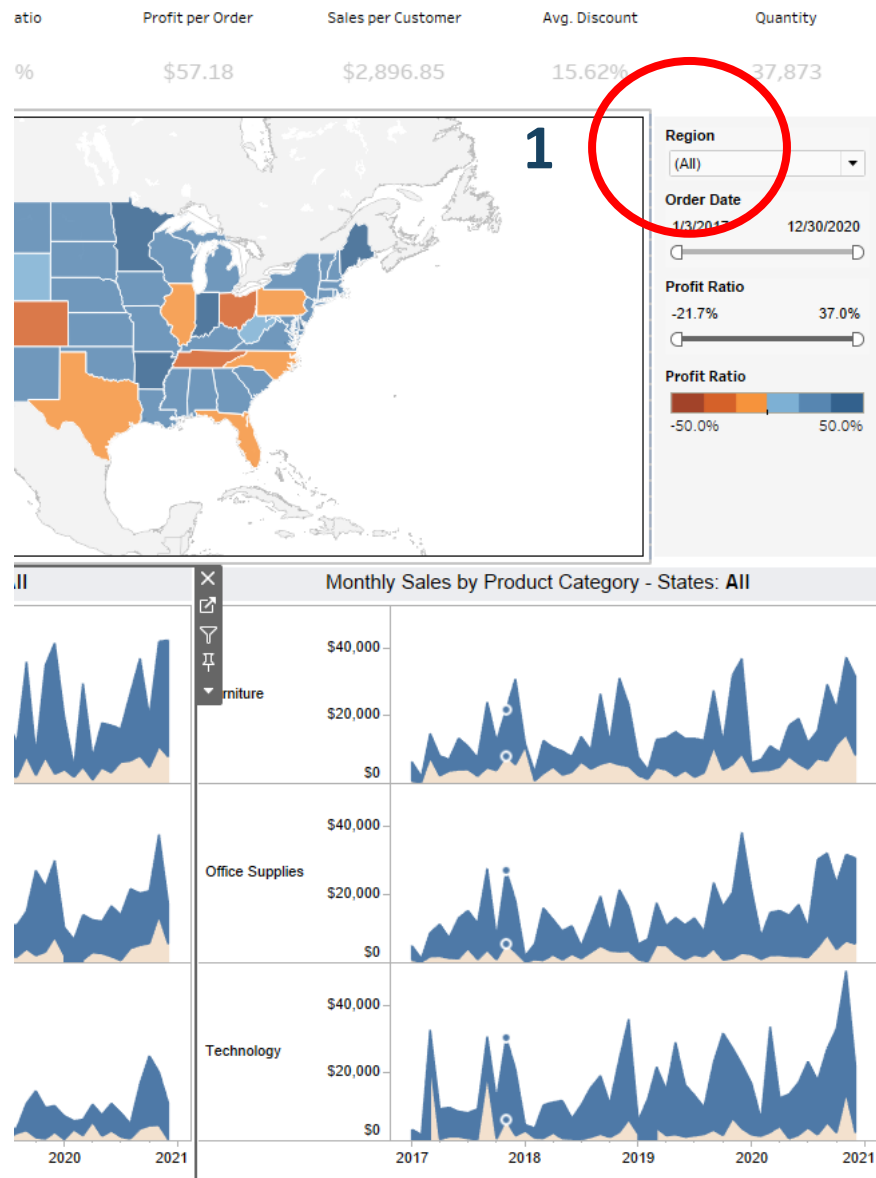
Source Field	Target Field	Target Data Source
State	State	Sample - Superstore

5

Add Filter... Edit... Remove

6 OK Cancel

Executive Overview - Profitability (All)



Filters

2

37,873

Region: (All)

3

Apply to Worksheets

4

Apply Filter to Worksheets [Region]

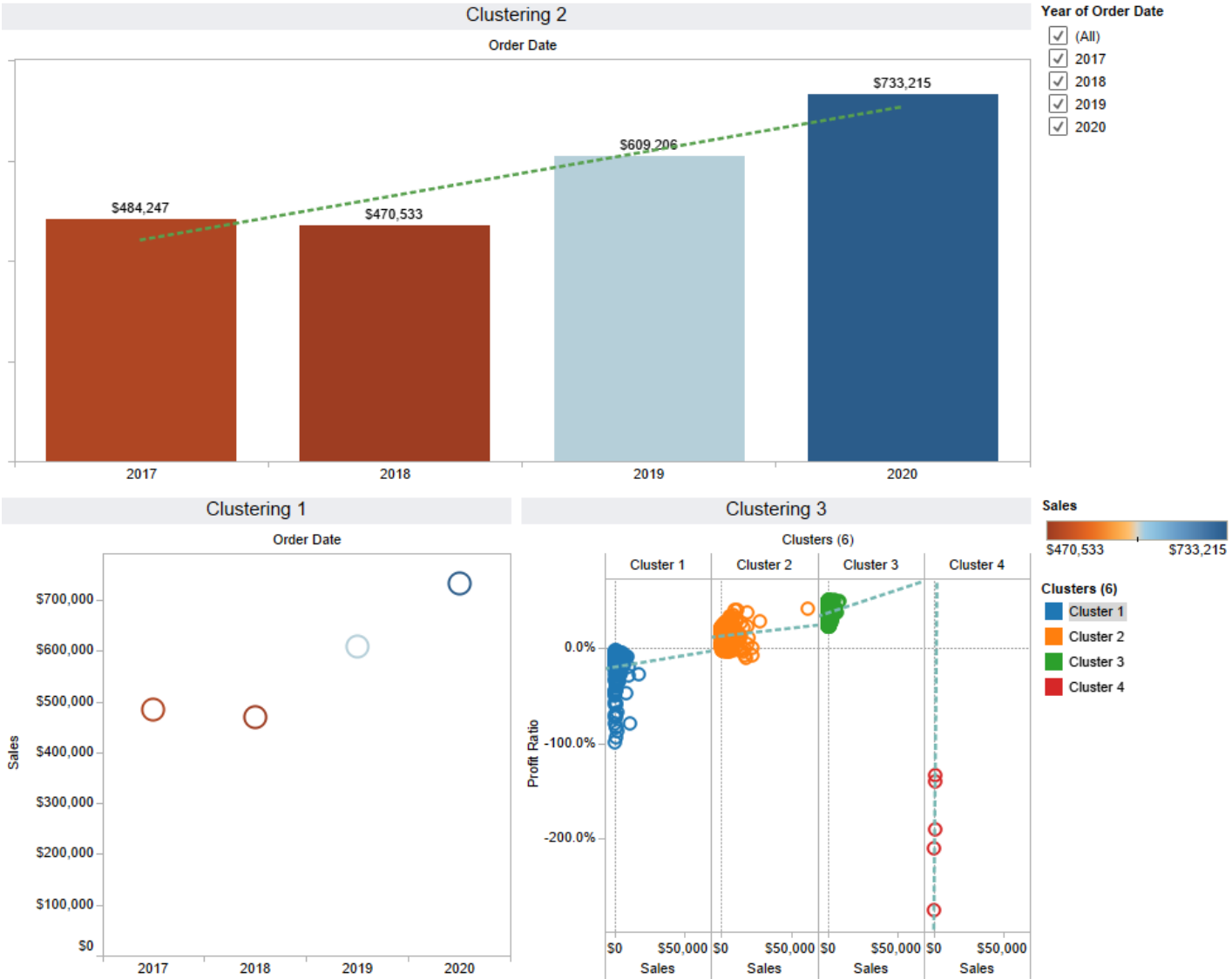
Filter will be applied to 4 worksheets.

Worksheets	Relationship	Details
<input checked="" type="checkbox"/> Sale Map	Region (Sample - Superstore)	
<input checked="" type="checkbox"/> Sales by Product	Region (Sample - Superstore)	
<input checked="" type="checkbox"/> Sales by Segment	Region (Sample - Superstore)	
<input checked="" type="checkbox"/> Total Sales	Region (Sample - Superstore)	

All on dashboard None ☐ Show all worksheets in workbook

OK Cancel

Clustering Dashboard



Scorecards

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Standard

1

Columns: YEAR(Order Date), Category, Sub-Category, Measure Names

Rows: Measure Names, YEAR(Order Date)

2

Filters: Measure Names, YEAR(Order Date)

3

Marks: Automatic, Color, Size, Text, Detail, Tooltip, Measure Values

4

Measure Values: SUM(Quantity), SUM(Sales)

Scorecard 1.a

Category	Sub-Category	Order Date	2017	2018	2019	2020
Furniture	Bookcases	Quantity	153			
		Sales	\$20,037			
	Chairs	Quantity	540			
		Sales	\$77,242			
Furnishings	Quantity	660				
	Sales	\$13,826				
Tables	Quantity	270				
	Sales	\$46,088				
Total	Quantity	1,623				
	Sales	\$157,193				
Office Supplies	Appliances	Quantity	314			
	Sales	\$15,314				
Art	Quantity	613				
	Sales	\$6,058				
Binders	Quantity	1,089				
	Sales	\$43,488				
Envelopes	Quantity	206				
	Sales	\$3,856				

YEAR(Order Date)

(All) ☒

2017 ☒

2018 ☒

2019 ☒

2020 ☒

Analytics

Sample - Superstore

Search

Tables

- Sales Forecast
- Orders (Count)

People

- Person
- People (Count)

Returns

- Returned
- Returns (Count)

Measure Names

- # of Variance Columns to Show
- % Difference Negative
- % Difference Positive
- % Difference Zero
- Colour
- Difference
- Difference %
- First Filter
- Last Filter
- One
- Profit per Order
- Profit Ratio
- Sales above Target?
- Sales per Customer
- Size
- Latitude (generated)
- Longitude (generated)

Filters

- YEAR(Order Date)
- Category: Office ..
- Sub-Category
- Last Filter
- First Filter: Fa..

Marks

- Automatic
- Color
- Size
- Text
- Detail
- Tooltip
- SUM(Quantity)
- SUM(Sales)
- Difference
- Difference %
- % Differenc..
- % Differenc..
- % Differenc..

Columns

- YEAR(Order Date)

Rows

- Category
- Sub-Category

Scorecard 1.d

Category	Sub-Category	2018	2019	2020
Office Supplies	Appliances	▲ 51.8%	▲ 12.1%	▲ 64.8%
	Art	▲ 3.0%	▼ -4.6%	▲ 48.7%
	Binders	▼ -16.1%	▲ 32.7%	▲ 46.5%
	Envelopes	▲ 17.0%	▲ 4.8%	▼ -40.0%
	Fasteners	▼ -21.3%	▲ 76.1%	▼ -12.0%
	Labels	▲ 4.0%	▼ -4.6%	▲ 36.6%
	Paper	▲ 3.1%	▲ 35.2%	▲ 34.0%
	Storage	▼ -11.7%	▲ 30.5%	▲ 18.5%
	Supplies	▼ -637.2%	▲ 631.3%	▲ 12.4%

AGG(First Filter)

- (All)
- ☒ False
- ☐ True

AGG>Last Filter)

- ☒ (All)
- ☒ False
- ☒ True

YEAR(Order Date)

(All)

Category

Office Supplies

Sub-Category

(All)



Scorecard



% Difference Positive

Sample - Superstore

```
If [Difference %] > 0
THEN "▲"
END
```

% Difference Negative

Sample - Superstore

```
If [Difference %] < 0
THEN "▼"
END
```

% Difference Zero

Sample - Superstore

```
If [Difference %] = 0
THEN "▲▼"
END
```

Colour

Sample - Superstore

```
IF [Difference %]<0 AND [Difference %] >-1 THEN "NEGATIVE"
ELSEIF [Difference %] >=.30 THEN "OVER 30%"
ELSEIF [Difference %]>=0 AND [Difference %] <.15 THEN "0-15"
ELSEIF [Difference %]>=.15 AND [Difference %] <.30 THEN "15"
ELSE Null
END
```

Difference

Sample - Superstore

Results are computed along Table (across).

```
SUM([Sales]) - LOOKUP(ZN(SUM([Sales])), -1)
```

Difference %

Sample - Superstore

Results are computed along Table (across).

```
IF (SUM([Sales]) - LOOKUP(ZN(SUM([Sales])), -1))>0 THEN
(SUM([Sales]) - LOOKUP(ZN(SUM([Sales])), -1)) / LOOKUP(ZN(S
ELSE
(SUM ([Sales]) - LOOKUP(ZN(SUM([Sales])), -1)) / SUM ([Sale
END
```

First Filter

Sample - Superstore

Results are computed along Table (across).

```
First () = 0
```

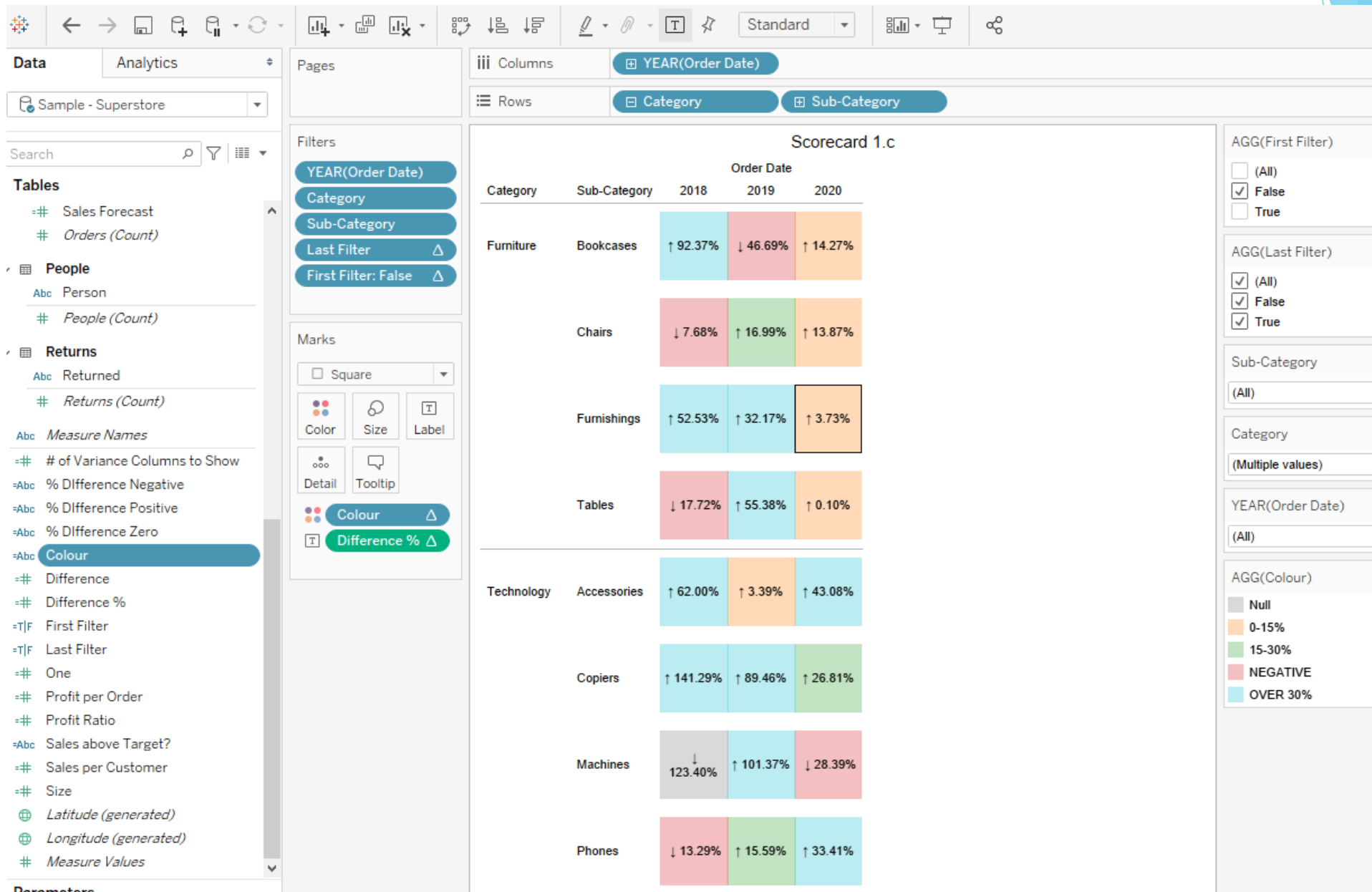
Last Filter

Sample - Superstore

Results are computed along Table (across).

```
Last () = 0
```

Tableau Business Intelligence Software



Scorecard

Tableau Business Intelligence Software



